

General Biology

Description of the Examination

The Subject Examination in General Biology covers material usually taught in a one-year biology course at the college level. The subject matter tested covers the broad field of the biological sciences, organized into three major areas: molecular and cellular biology, organismal biology, and population biology. The exam gives approximately equal weight to these three areas, and the questions relating to them are interspersed randomly throughout the exam.

The exam consists of approximately 120 multiple-choice questions to be answered in two separately timed 45-minute sections.

Knowledge and Skills Required

Questions on the exam require candidates to demonstrate one or more of the following abilities.

- Knowledge of facts, principles, and processes of biology
- Understanding of the means by which information is collected and how it is interpreted
- Understanding of how one hypothesizes from available information and how one draws conclusions and makes further predictions
- Understanding that science is a human endeavor with social consequences

The subject matter of the General Biology exam is drawn from the following topics.

Approximate Percent of Examination

33%	Molecular and Cellular Biology
34%	Organismal Biology
33%	Population Biology

33% Molecular and Cellular Biology

Chemical composition of organisms

Simple chemical reactions and bonds

Properties of water

Chemical structure of carbohydrates, lipids, proteins, organic acids, nucleic acids

Cells

Structure and function of cell organelles

Properties of cell membranes

Comparison of prokaryotic and eukaryotic cells

Enzymes

Enzyme-substrate complex

Role of coenzymes

Inorganic cofactors

Prosthetic groups

Energy transformations

- Glycolysis, respiration, anaerobic pathways

- Photosynthesis

Cell division

- Structure of chromosomes

- Mitosis, meiosis, and cytokinesis in plants and animals

Chemical nature of the gene

- Watson-Crick model of nucleic acids

DNA replication

- Mutations

- Control of protein synthesis: transcription, translation, post-transcriptional processing

- Structural and regulatory genes

- Transformation and transduction

The origin of life

- Modern theories

- Experimental evidence

Structure and function in plants with emphasis on angiosperms

- Root, stem, leaf, flower, seed, fruit

- Water and mineral absorption and transport

- Food translocation and storage

Plant reproduction and development

- Alternation of generations in ferns, pines, and flowering plants

- Gamete formation and fertilization

- Growth and development: hormonal control

- Tropism and photoperiodicity

Structure and function in animals with emphasis on vertebrates

- Major systems

- Homeostatic mechanisms

- Hormonal control in homeostasis and reproduction

Animal reproduction and development

- Gamete formation, fertilization

- Cleavage, gastrulation, germ layer formation, differentiation of organ systems

- Experimental analysis of vertebrate development

- Extraembryonic membranes of vertebrates

- Formation and function of the mammalian placenta

- Blood circulation in the human embryo

Principles of heredity

- History of early experiments in heredity

- Mendelian inheritance (dominance, segregation, independent assortment)

- Chromosomal basis of inheritance

- Linkage

- Sex-linked, sex-influenced, sex-limited inheritance

- Polygenic inheritance (height, skin color)

- Multiple alleles (human blood groups)

Principles of ecology

- Energy flow and productivity in ecosystems
- Biogeochemical cycles
- Population growth and regulation (natality, mortality, competition, migration, density)
- Community structure, growth, regulation (major biomes, succession and climax communities)
- Habitat (biotic and abiotic factors)
- Concept of niche
- Principles of evolution
 - History of evolutionary concepts, Lamarckian and Darwinian theories
 - Adaptive radiation
 - Major features of plant and animal evolution
 - Concepts of homology and analogy
 - Convergence, extinction, balanced polymorphism, genetic drift
 - Classification of living organisms
 - Evolutionary history of humans
- Principles of behavior
 - Stereotyped, learned social behavior
 - Societies (ants, bees, birds, primates)
- Social biology
 - Problem of human population growth (age composition, birth and fertility rates, theory of demographic transition)
 - Human intervention in the natural world (management of resources, environmental pollution)
 - Implications of biomedical progress (control of human reproduction, genetic engineering)

Study Resources

Most textbooks used in college-level introductory biology courses cover the topics in the outline given earlier, but their approaches to certain topics and the emphases given to them may differ. To prepare for the General Biology exam, a candidate is advised to study one or more college textbooks, which can be found in most college bookstores. When selecting a textbook, check the table of contents against the "Knowledge and Skills Required" section. In addition, candidates would do well to consult pertinent articles from the monthly magazine *Scientific American*, available in most libraries. The Internet is another resource the candidate could explore.